

243 Genetic parameters for calving ease on beef-

on-dairy. Arielly Oliveira Garcia¹, John B. Cole², Ashley A. Mikush³, Shogo Tsuruta¹, Simone E. F. Guimarães⁴, Ignacy Misztal¹, Daniela Lourenco¹, ¹*University of Georgia*, ²*Council on Dairy Cattle Breeding*, ³*PEAK*, ⁴*Universidade Federal de Vicosa*

Abstract: Crossbreeding dairy cows with beef bulls increases the market value of surplus calves but may impact calving ease (CE), affecting cow health and productivity. We used linear and threshold animal models to estimate genetic parameters and breeding values for direct and maternal additive effects for calving ease in beef-on-dairy crosses considering only the first or the first three lactations. At birth, the calves received a score from 1 to 5, in which a CE score of 1 indicates no problem, 2 slight problem, 3 needed assistance, 4 considerable force, and 5 extreme difficulty. Although CE was scored in five categories, we compared the beef (1= easy and 2+= difficult) and dairy (1,2,3= easy and 4,5= difficult) definitions, as a binary trait. We analyzed around 230k CE records in the first lactation and around 1.3M in the first three lactations from Holstein and Jersey cows inseminated with Angus, Charolais, or Simmental semen. We compared single-trait linear and threshold models with age of the cow as a covariable, sex of the calf, dam-sire breed interaction, and year-season as fixed effects; and herd-year, animal, and maternal effects as random. The average incidence of scores ≥ 2 considering different crosses was approximately 15%, whereas scores ≥ 4 was 1%. Due to the low incidence, the models considering the definition of easy and difficult for dairy cattle did not converge, and therefore, are not reported. Direct and maternal heritabilities for the linear (threshold) model were 0.01 ± 0.002 (0.01 ± 0.001) and 0.02 ± 0.002 (0.04 ± 0.004) using the first lactation, and equal to 0.01 ± 0.003 (0.03 ± 0.004) and 0.19 ± 0.002 (0.25 ± 0.005) considering the first three lactations. Despite the small magnitude, maternal heritabilities were always greater than the direct ones. Maternal heritabilities are inflated when we consider more than one lactation, probably because of confounding with the maternal permanent environmental effect. Linear and threshold models provided similar EBV rankings, with a correlation of at least 0.90. Validation metrics were better for the linear model with only the first lactation records. Although direct heritabilities were low, there is genetic variability for calving ease, and accounting for this trait when selecting beef bulls can help reduce the incidence of difficult calving when they are bred to dairy cows. One

of the challenges in beef-on-dairy analyses is the lack of pedigree depth on the sire side. When this is the case, we suggest using linear animal models considering only the first lactation to evaluate CE, given that EBV are highly correlated with those obtained by the threshold model but are less biased and converge almost 10 times faster, proving to be more efficient for routine genetic evaluations.

Keywords: calving difficulty, crossbreed, variance components